08/957512

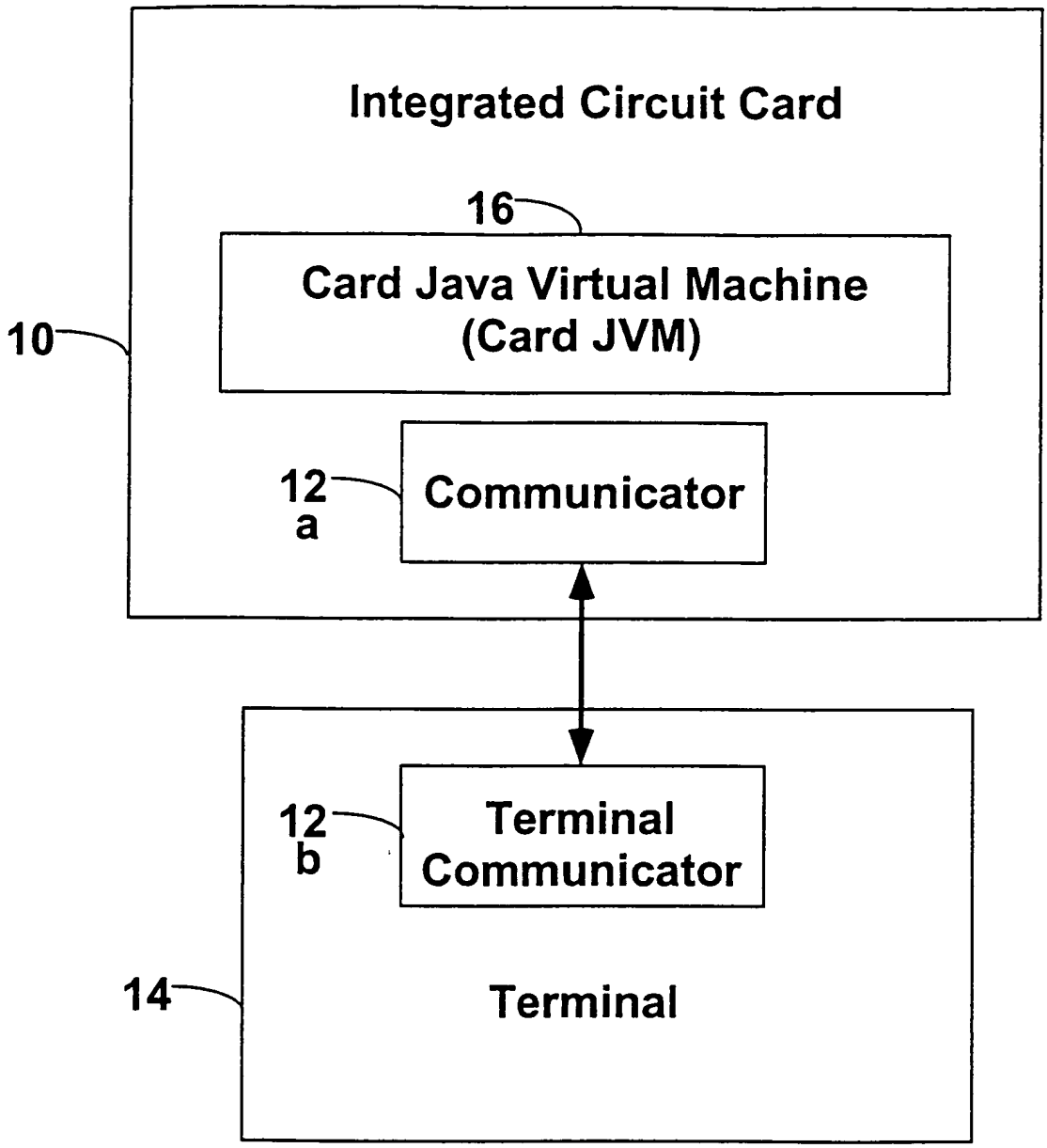


Fig. 1

08/957512

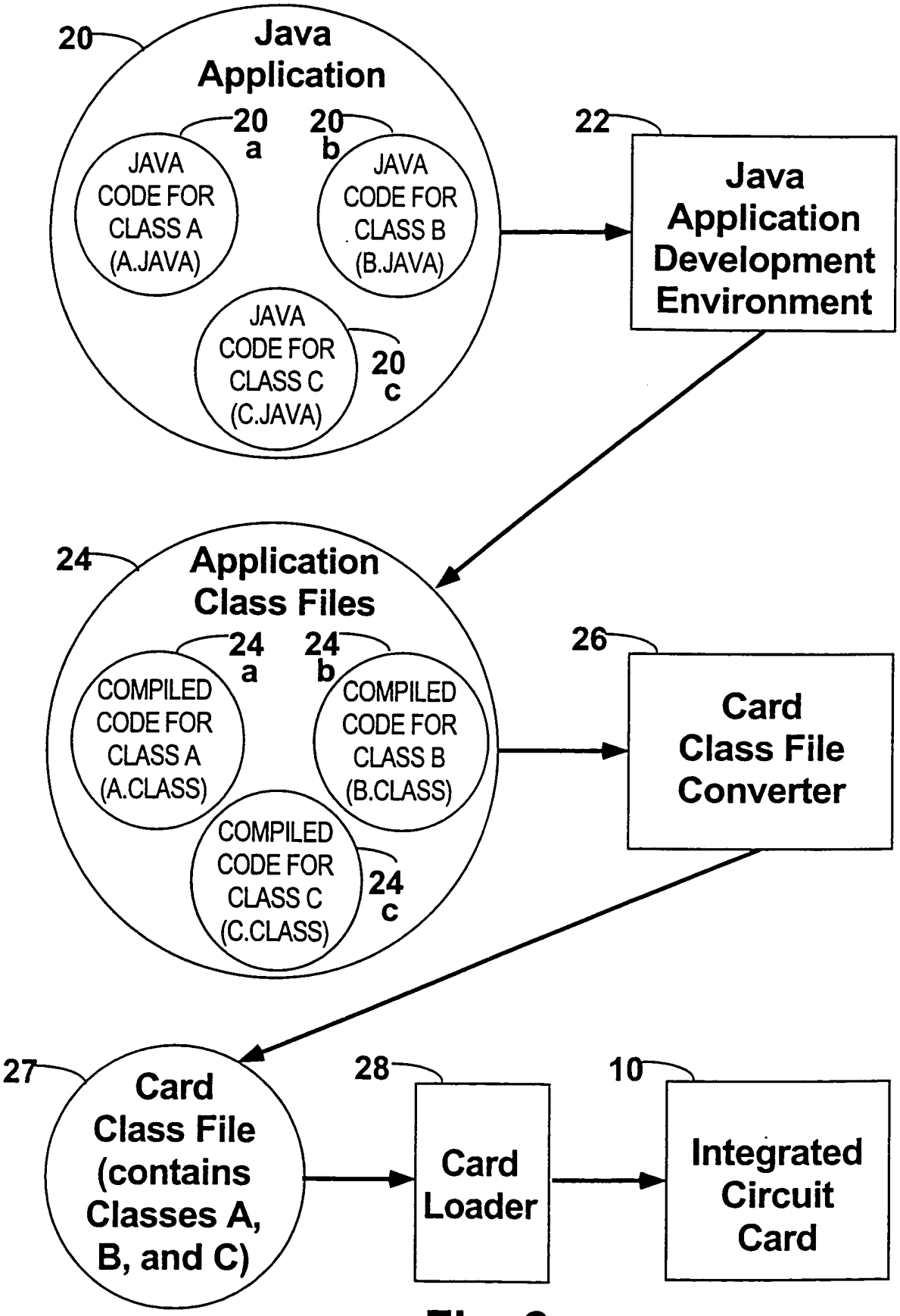


Fig. 2

08/457512

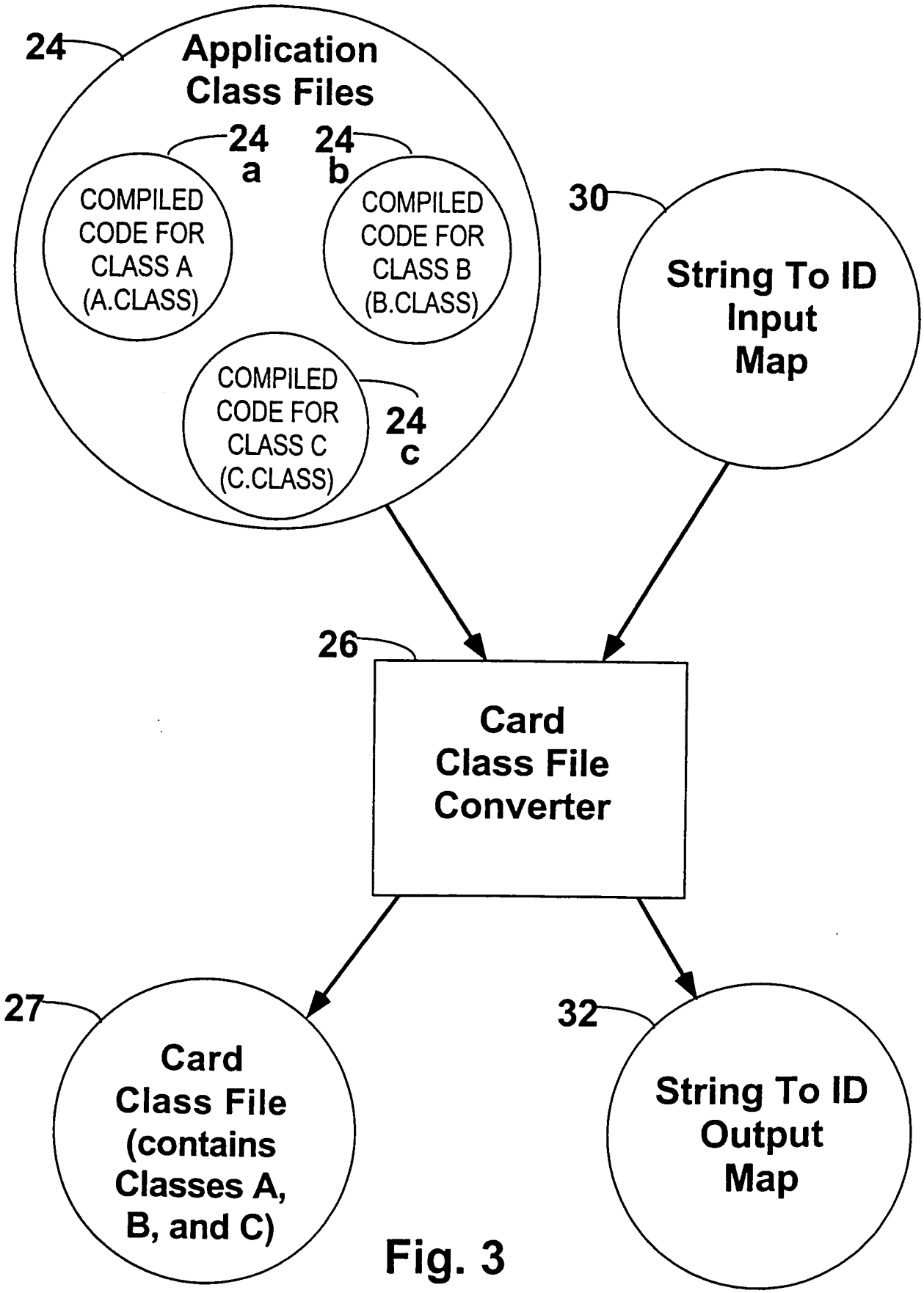


Fig. 3

08557512 - 102497

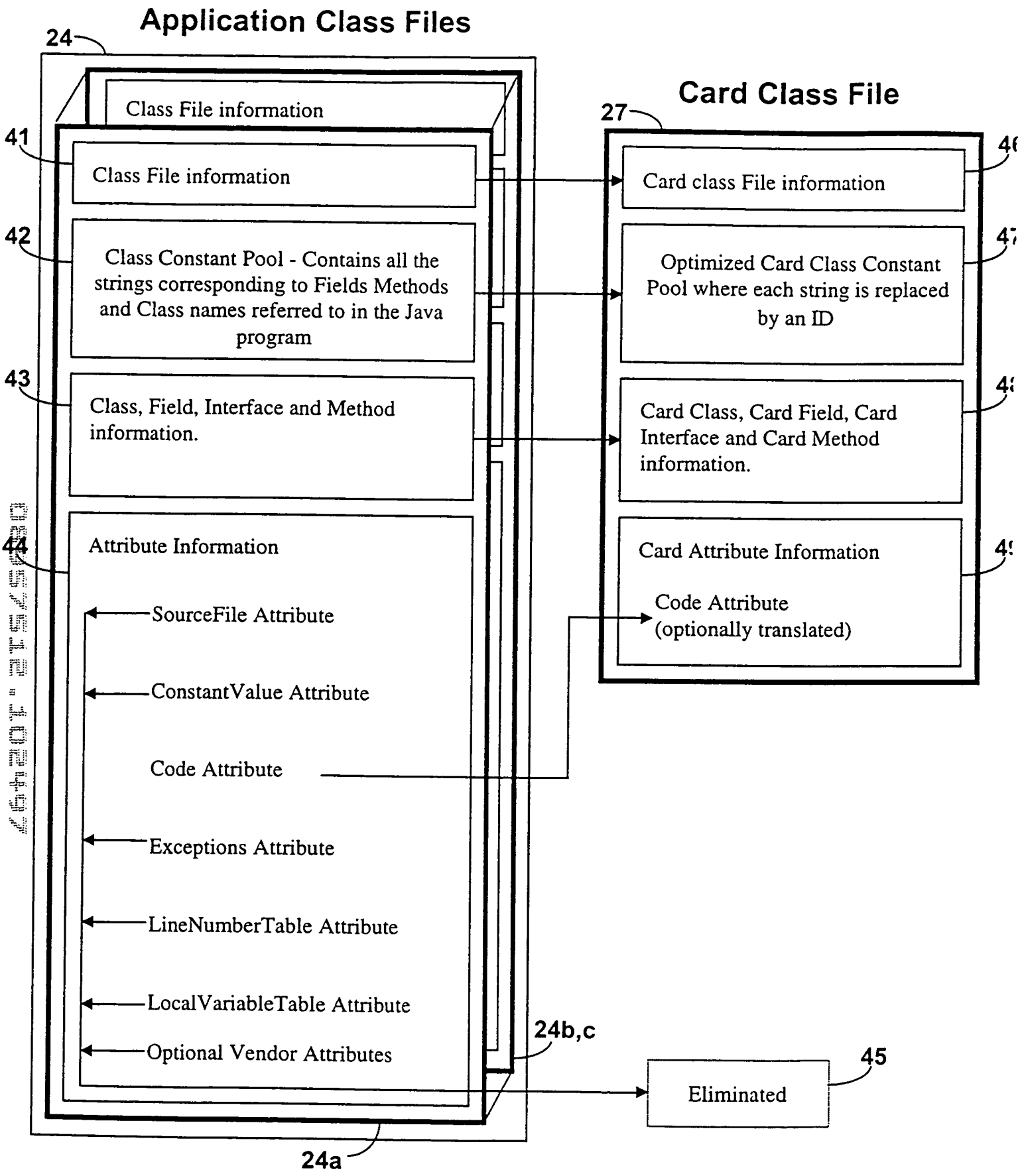

Application Class Files
24
Class File information
41
Class File information
42
Class Constant Pool - Contains all the strings corresponding to Fields Methods and Class names referred to in the Java program
43
Class, Field, Interface and Method information.
44
Attribute Information
SourceFile Attribute
ConstantValue Attribute
Code Attribute
Exceptions Attribute
LineNumberTable Attribute
LocalVariableTable Attribute
Optional Vendor Attributes
24a
24b,c
Card Class File
27
Card class File information
Optimized Card Class Constant Pool where each string is replaced by an ID
Card Class, Card Field, Card Interface and Card Method information.
Card Attribute Information
Code Attribute (optionally translated)
45
Eliminated

Fig. 4

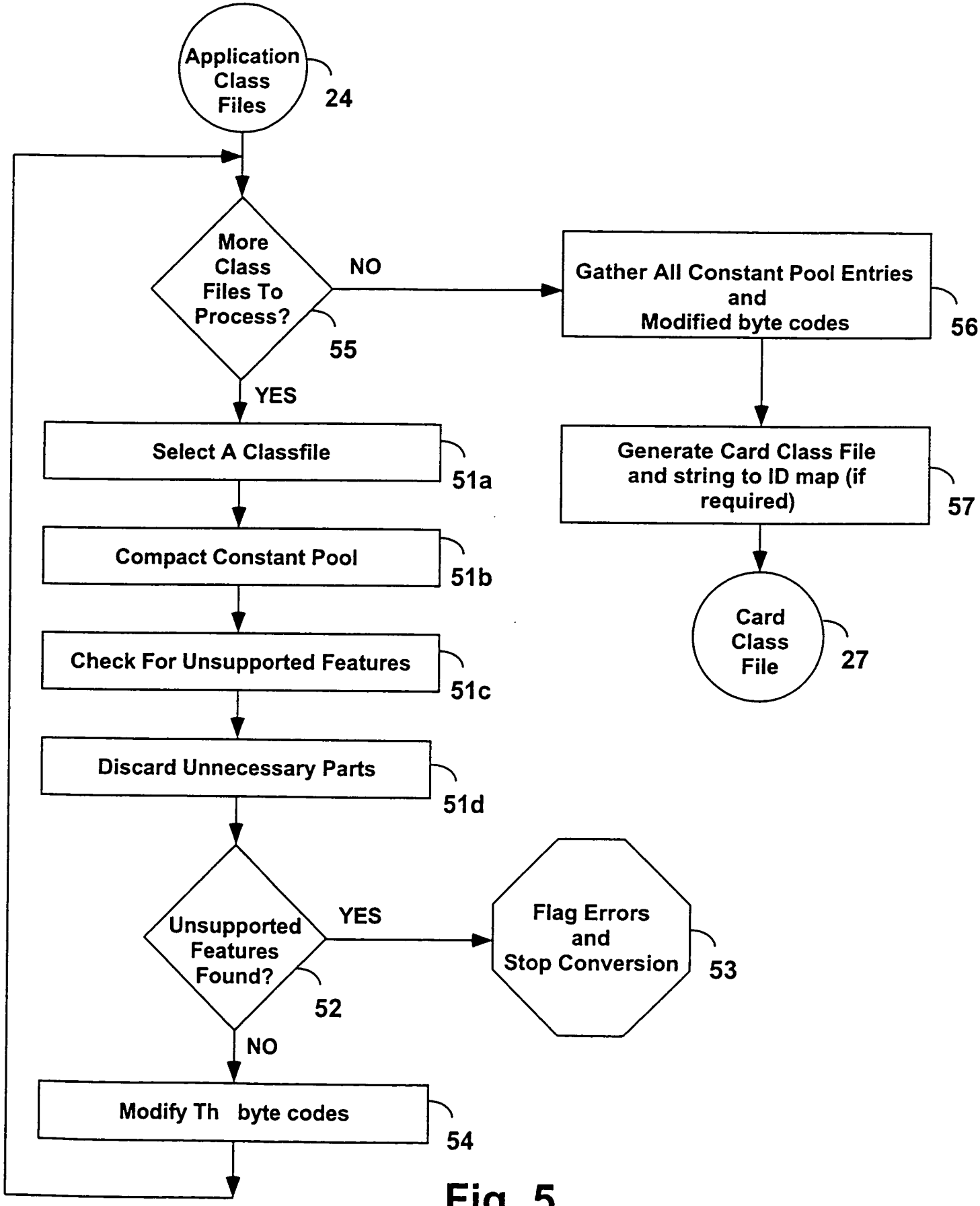

Application Class Files
24
More Class Files To Process?
55
NO
YES
Gather All Constant Pool Entries and Modified byte codes
56
Generate Card Class File and string to ID map (if required)
57
Card Class File
27
Select A Classfile
51a
Compact Constant Pool
51b
Check For Unsupported Features
51c
Discard Unnecessary Parts
51d
Unsupported Features Found?
52
YES
Flag Errors and Stop Conversion
53
NO
Modify Th byte codes
54

Fig. 5

08/957512

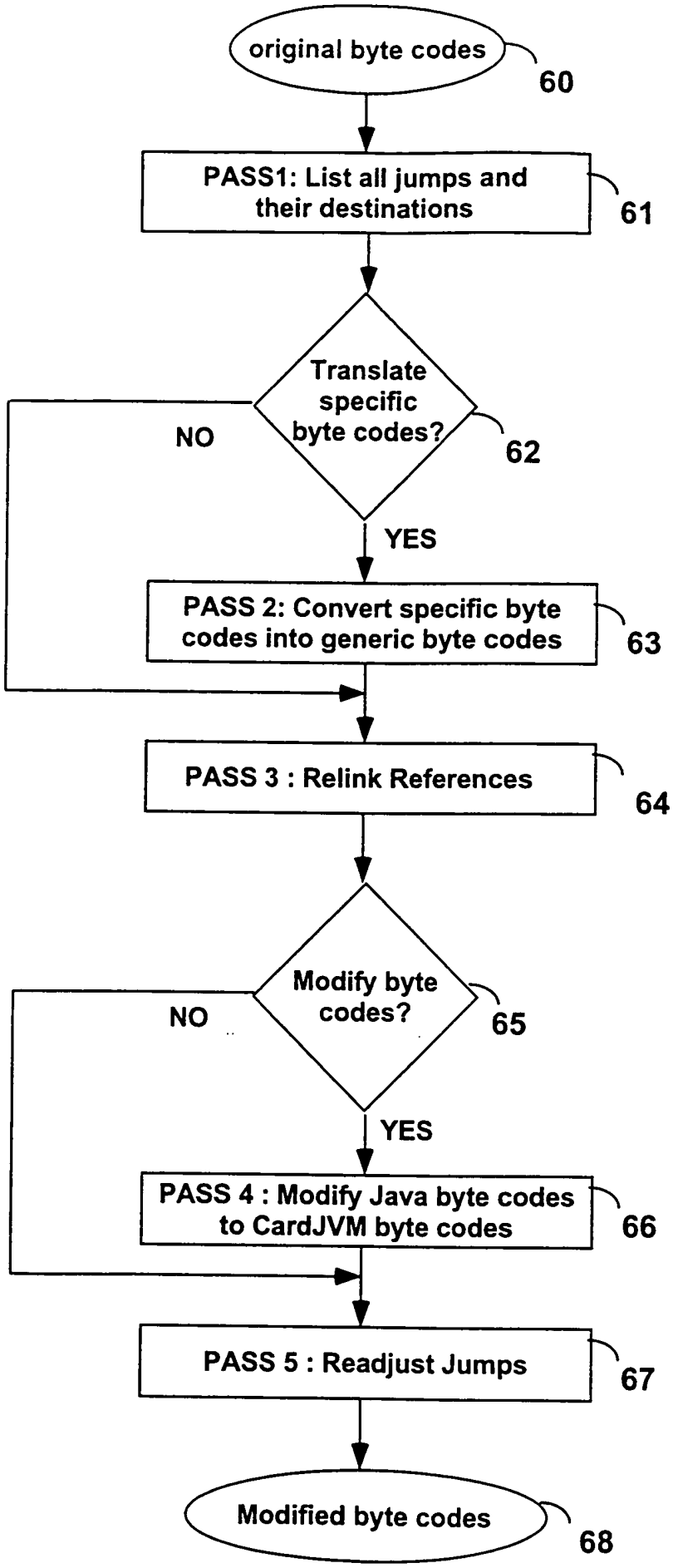


Fig. 6

Oberthur Exhibit 2045 - Page 7 of 9

08/957572

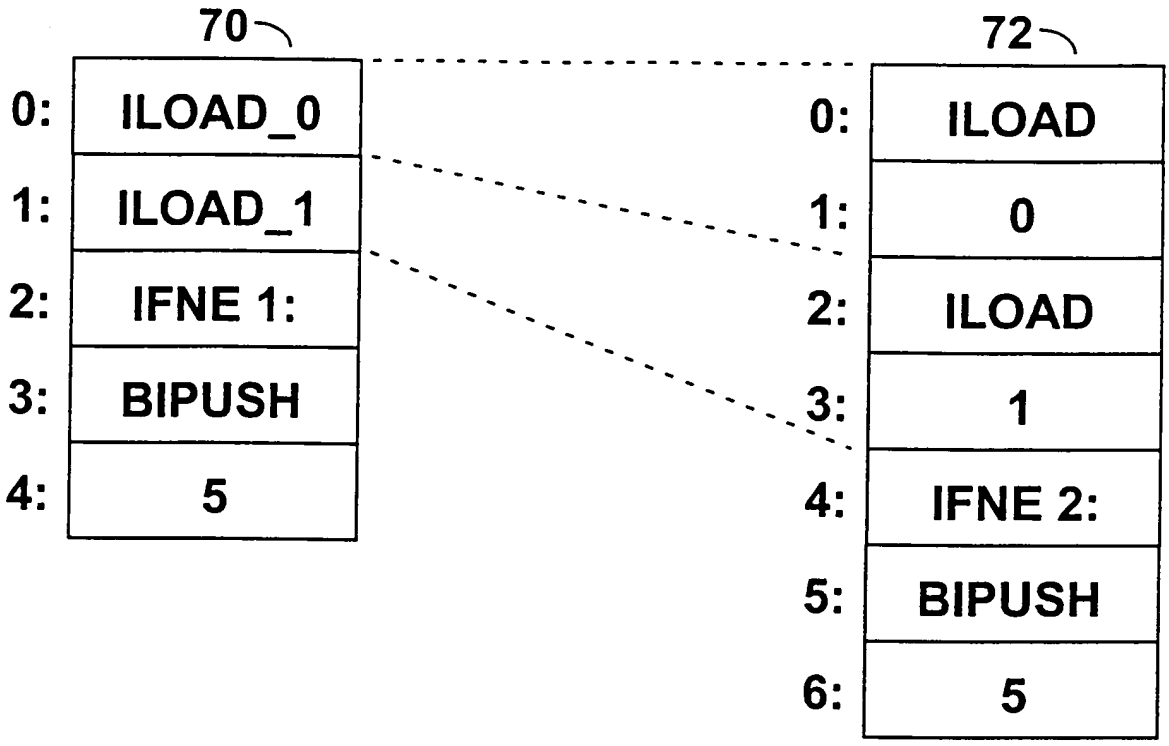
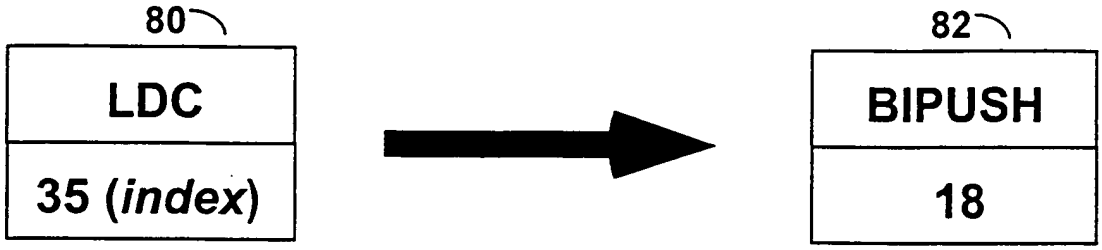
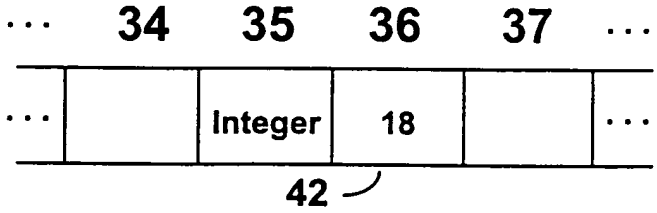


Fig. 7

Sheet 7 of 25 - 08957572





Class file Constant Pool

Fig. 8

Docket No. 10559-1350

08/957512

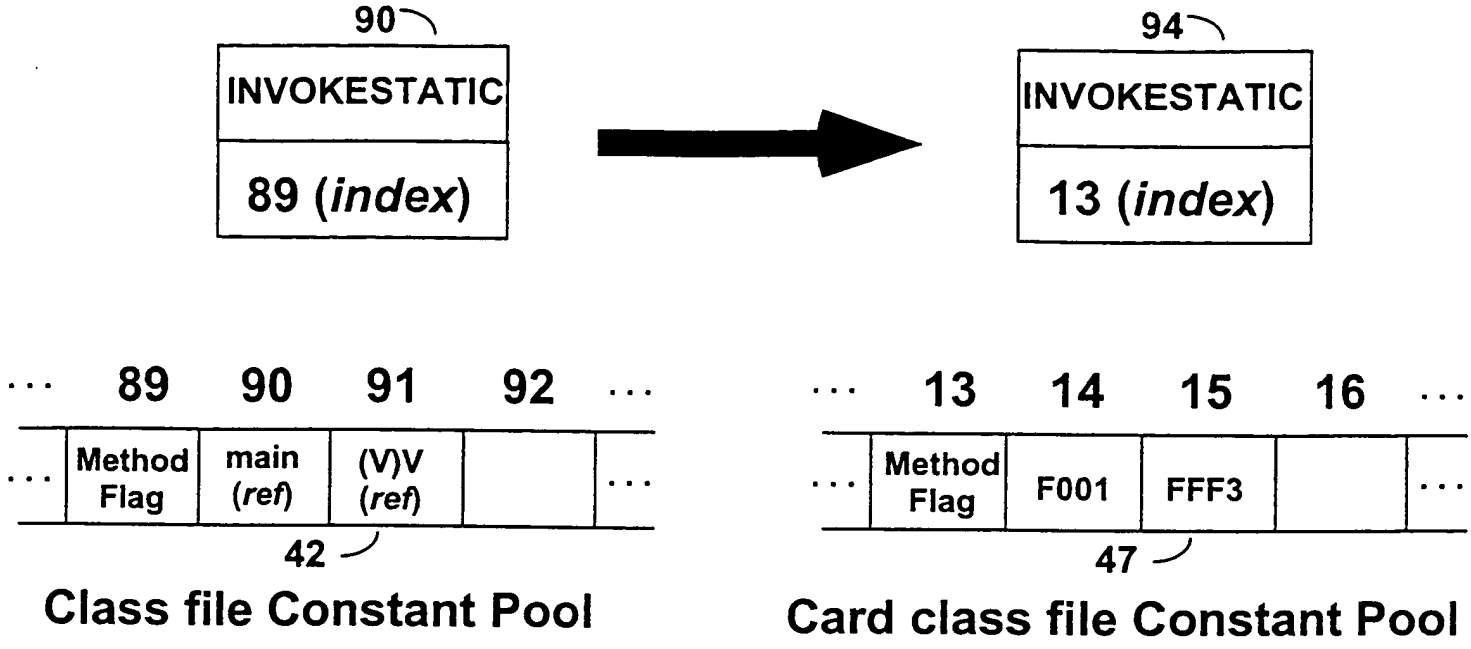


Fig. 9

Attorney Docket No. 42390.P5568

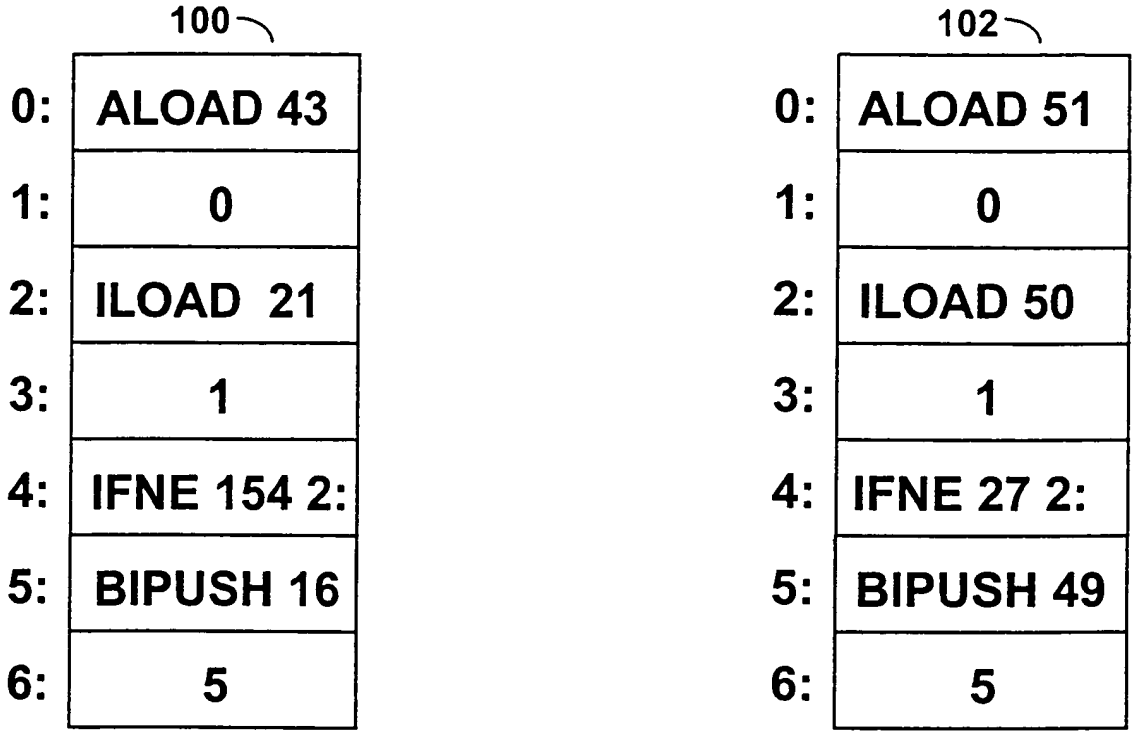


Fig. 10

Docket No. 42390.P4952

08/957572

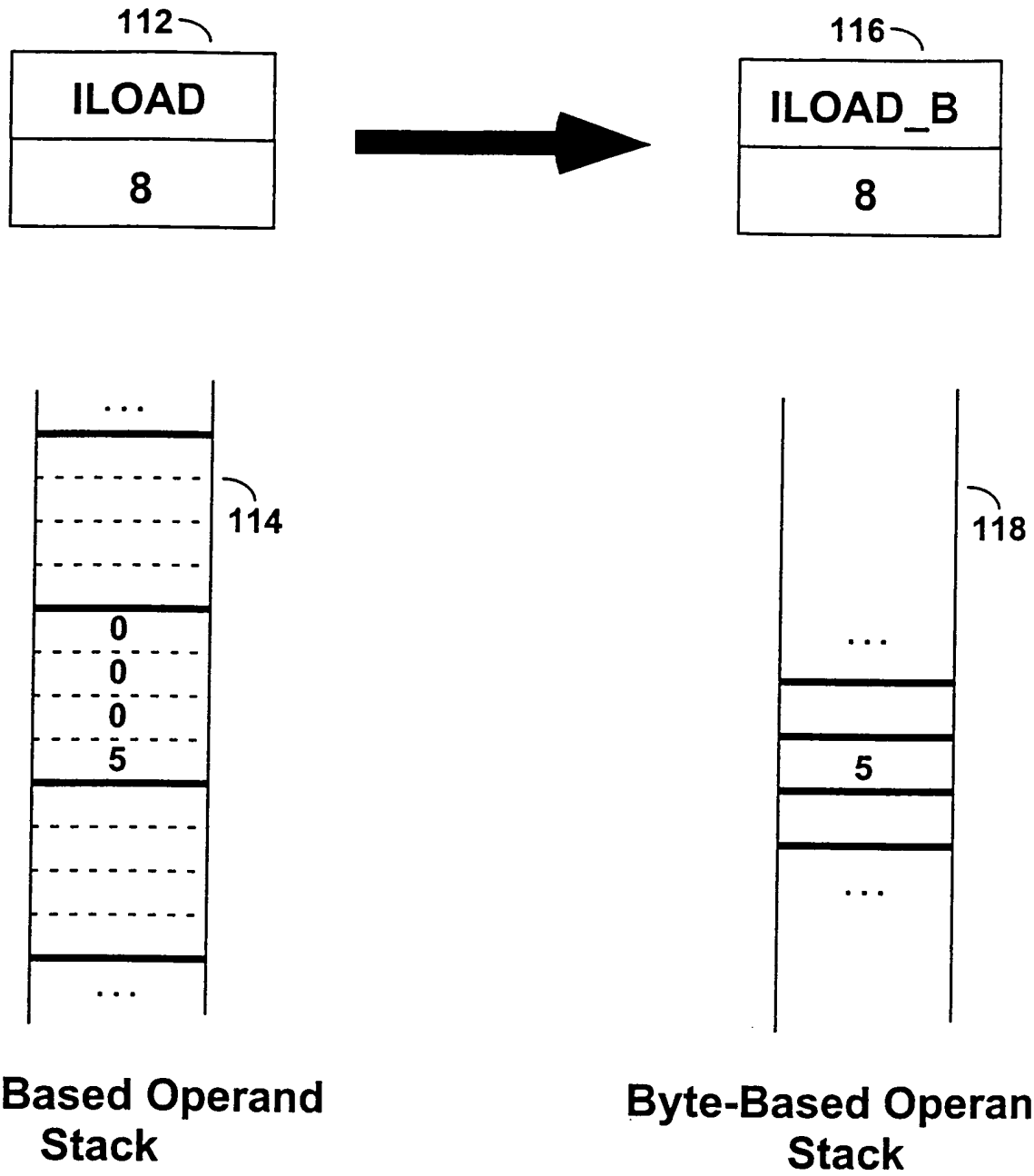


Fig. 11

Docket No. 42390.P5957

26h20f" 2152563D

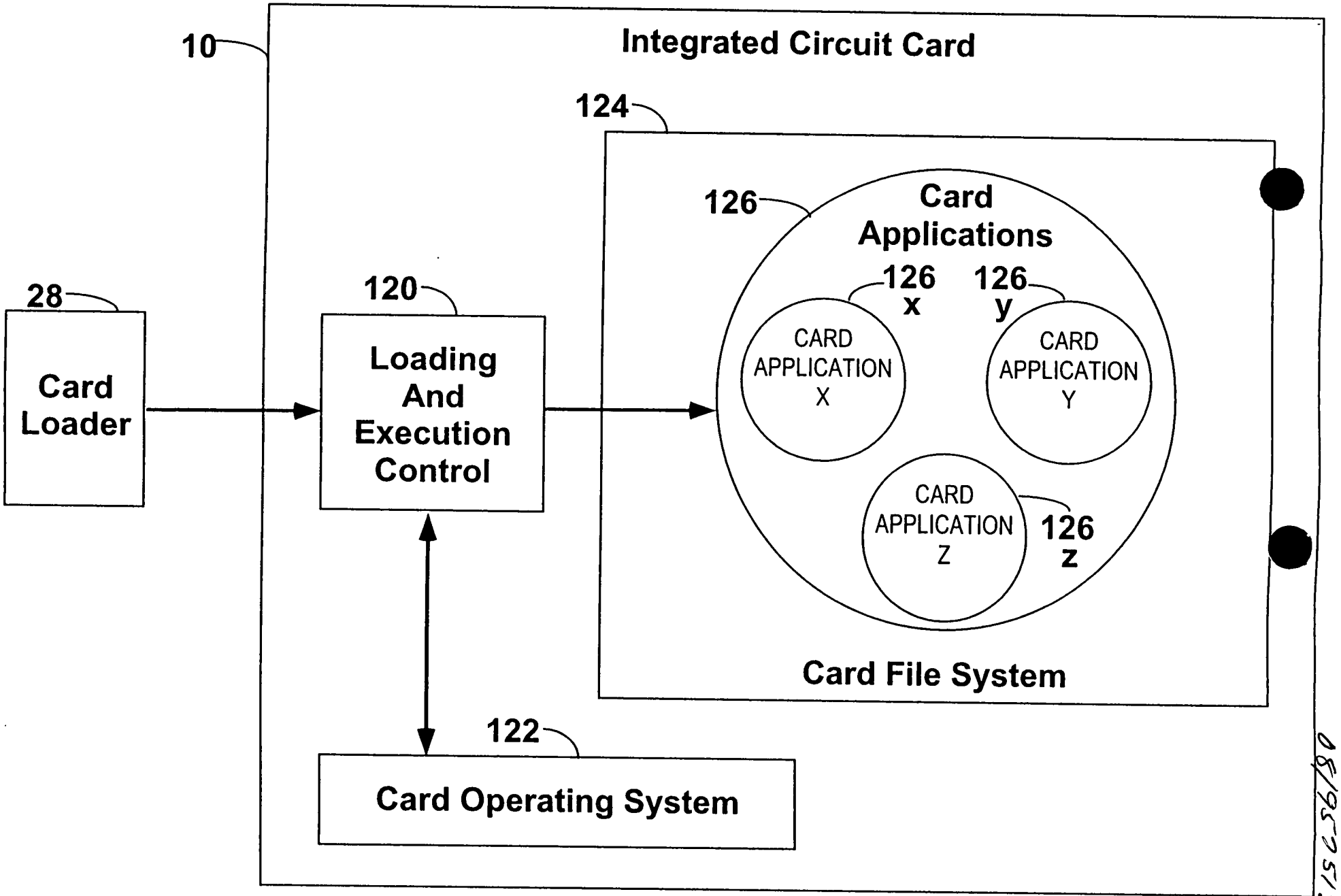


Fig. 12

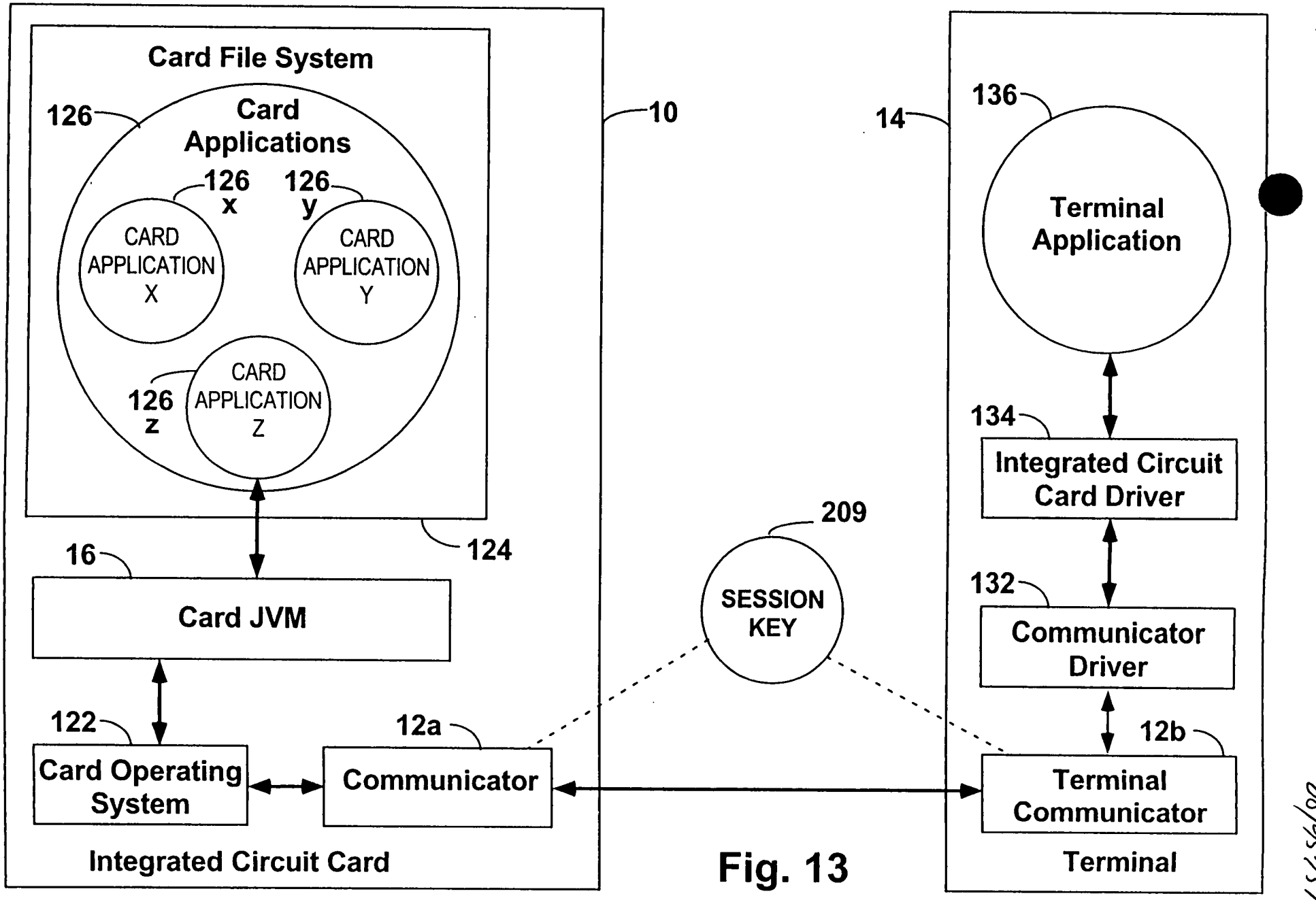

Card File System
126
Card Applications
126 x
126 y
CARD APPLICATION X
CARD APPLICATION Y
126 z
CARD APPLICATION Z
10
124
16
Card JVM
122
Card Operating System
12a
Communicator
Integrated Circuit Card
209
SESSION KEY
14
136
Terminal Application
134
Integrated Circuit Card Driver
132
Communicator Driver
12b
Terminal Communicator
Terminal

Fig. 13

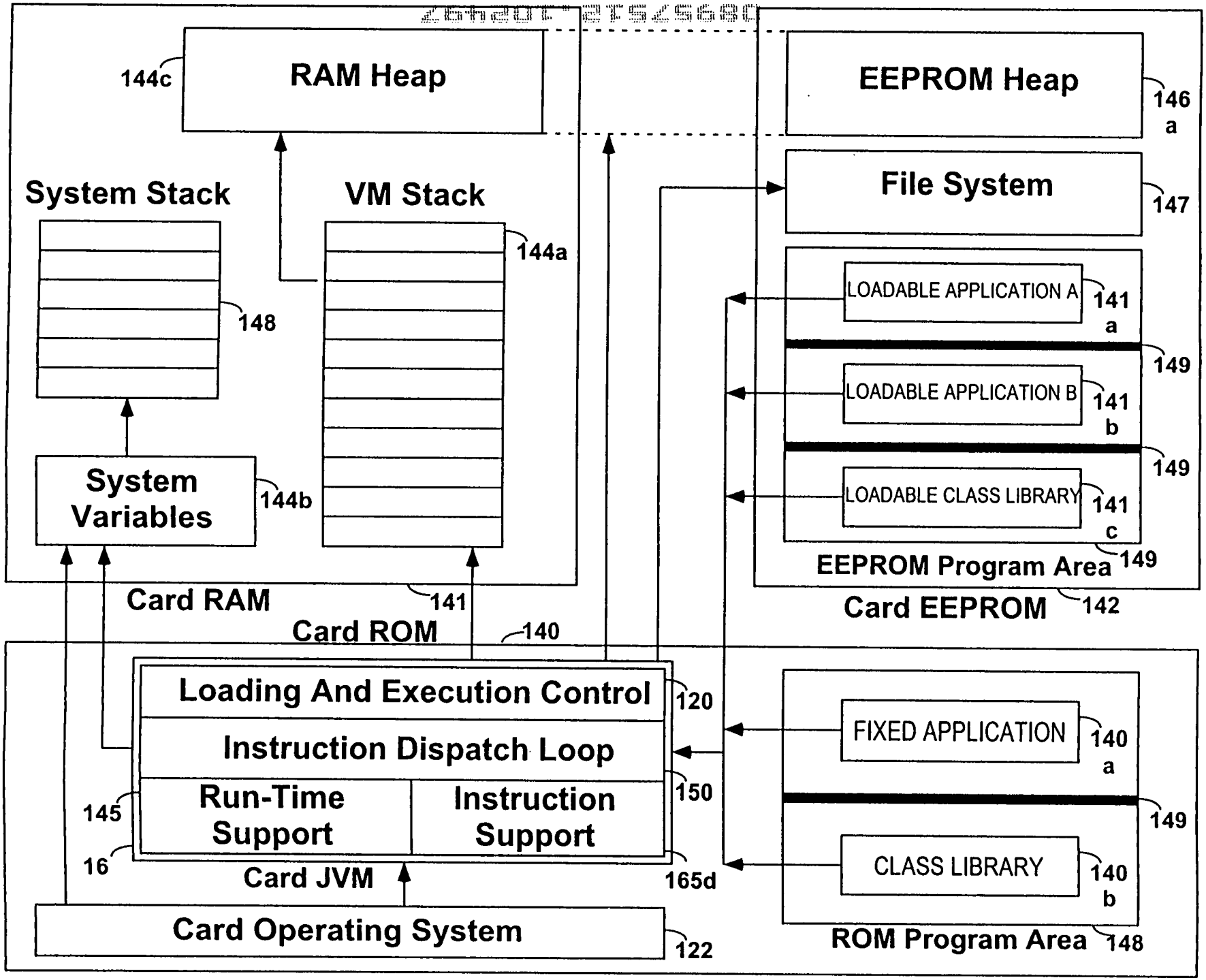

RAM Heap
144c
EEPROM Heap
146 a
System Stack
VM Stack
144a
File System
147
148
LOADABLE APPLICATION A
141 a
149
LOADABLE APPLICATION B
141 b
149
System Variables
144b
LOADABLE CLASS LIBRARY
141 c
149
EEPROM Program Area
Card RAM
141
Card EEPROM
142
Card ROM
140
Loading And Execution Control
120
FIXED APPLICATION
140 a
Instruction Dispatch Loop
150
149
145
Run-Time Support
Instruction Support
16
CLASS LIBRARY
140 b
Card JVM
165d
Card Operating System
122
ROM Program Area
148

FIG.14

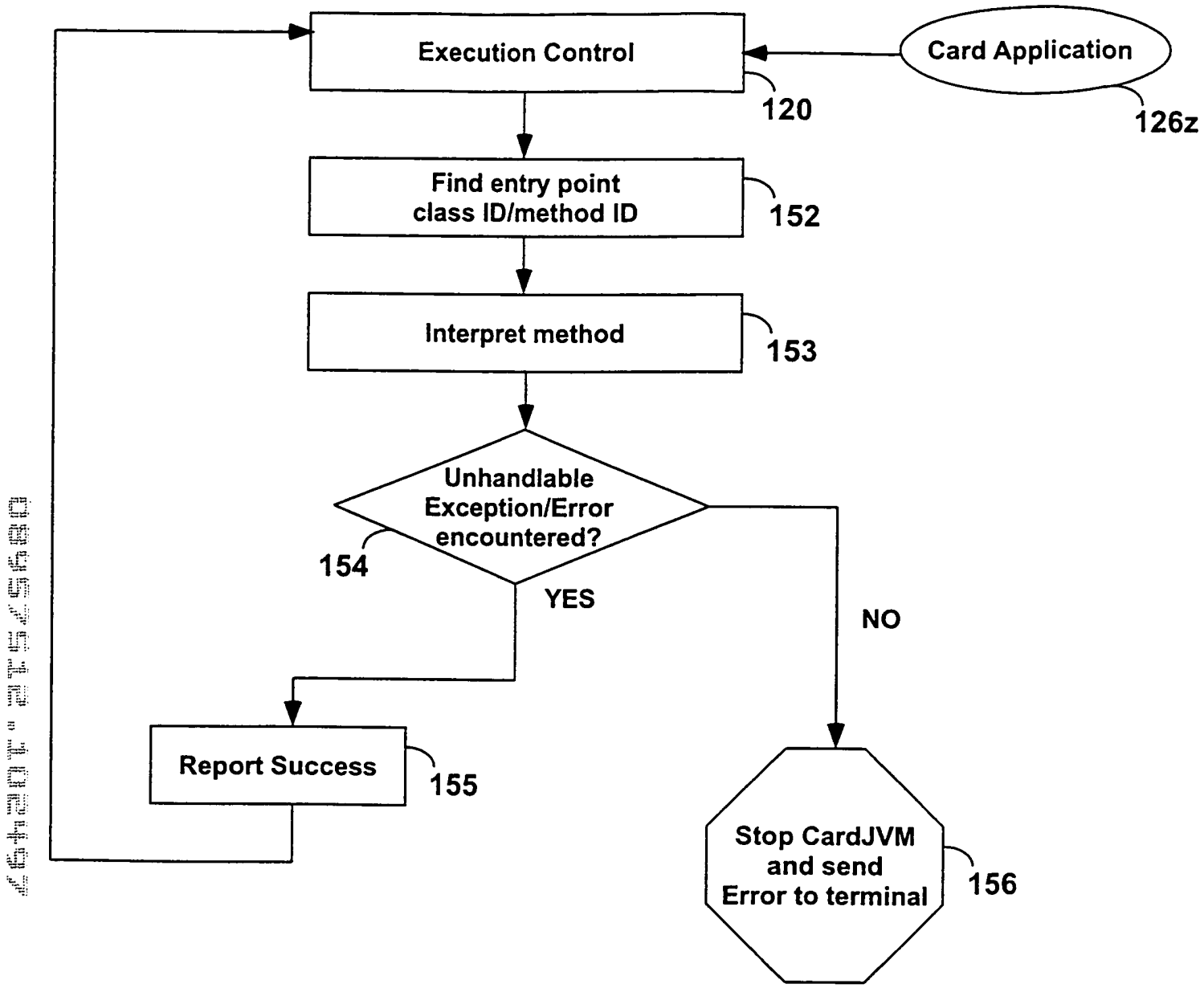

Execution Control
120
Card Application
126z
Find entry point
class ID/method ID
152
Interpret method
153
Unhandlable
Exception/Error
encountered?
154
YES
NO
Report Success
155
Stop CardJVM
and send
Error to terminal
156

Fig. 15

08/957512

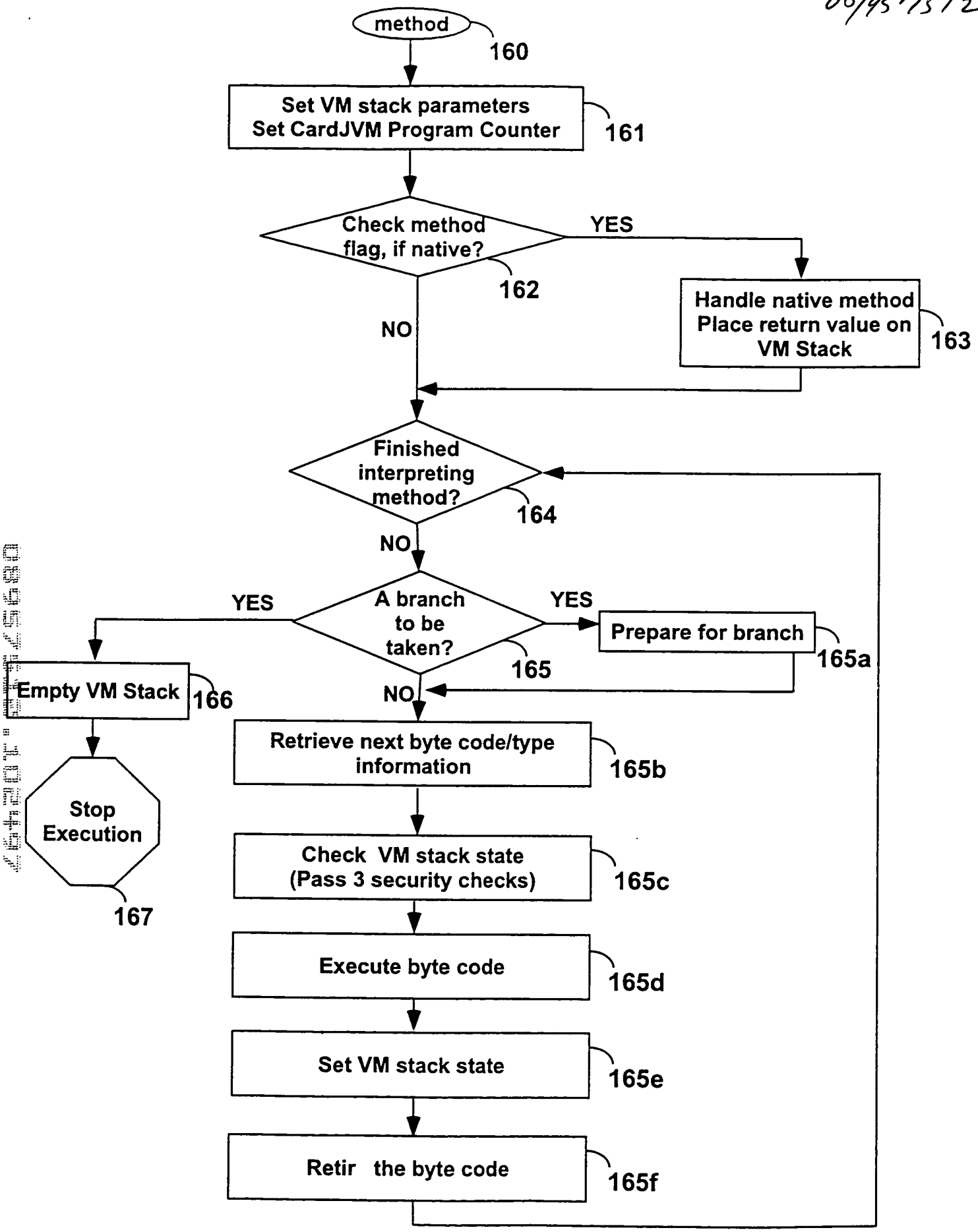


Fig. 16

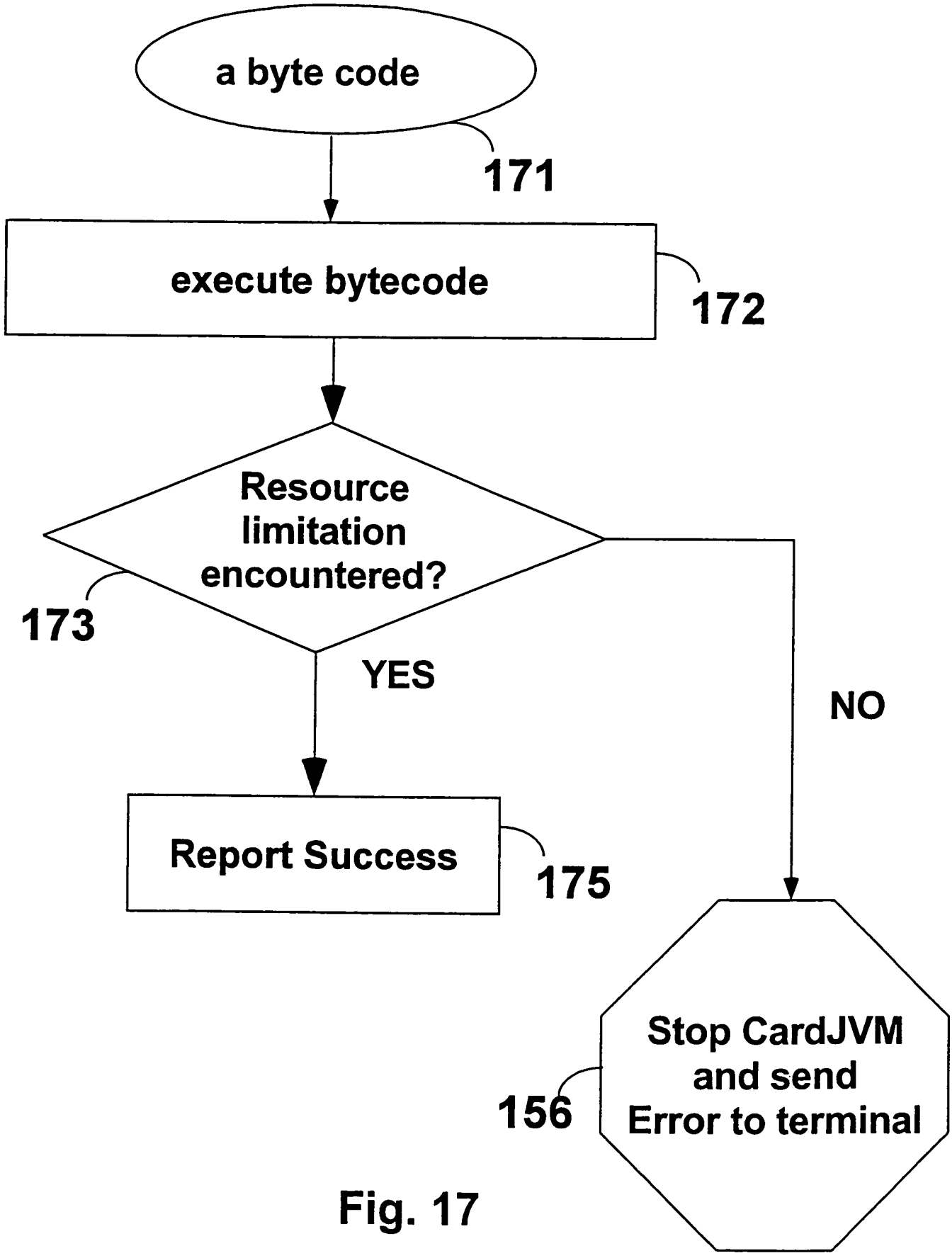


Fig. 17

Attorney Docket: 21565680

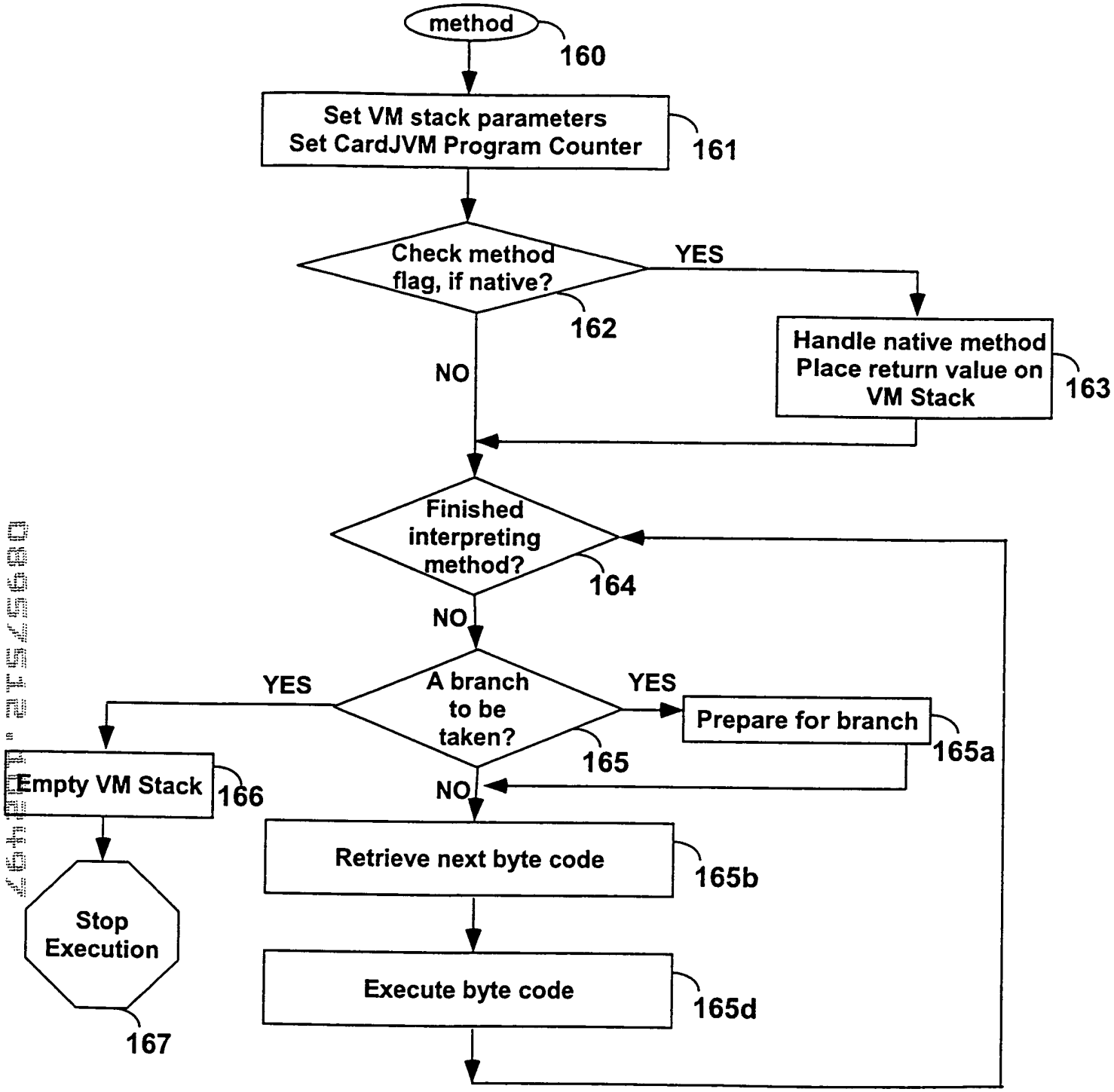

method
160
Set VM stack parameters
Set CardJVM Program Counter
161
Check method flag, if native?
162
YES
NO
Handle native method
Place return value on VM Stack
163
Finished interpreting method?
164
NO
A branch to be taken?
165
YES
YES
Prepare for branch
165a
NO
Empty VM Stack
166
Stop Execution
167
Retrieve next byte code
165b
Execute byte code
165d

Fig. 18

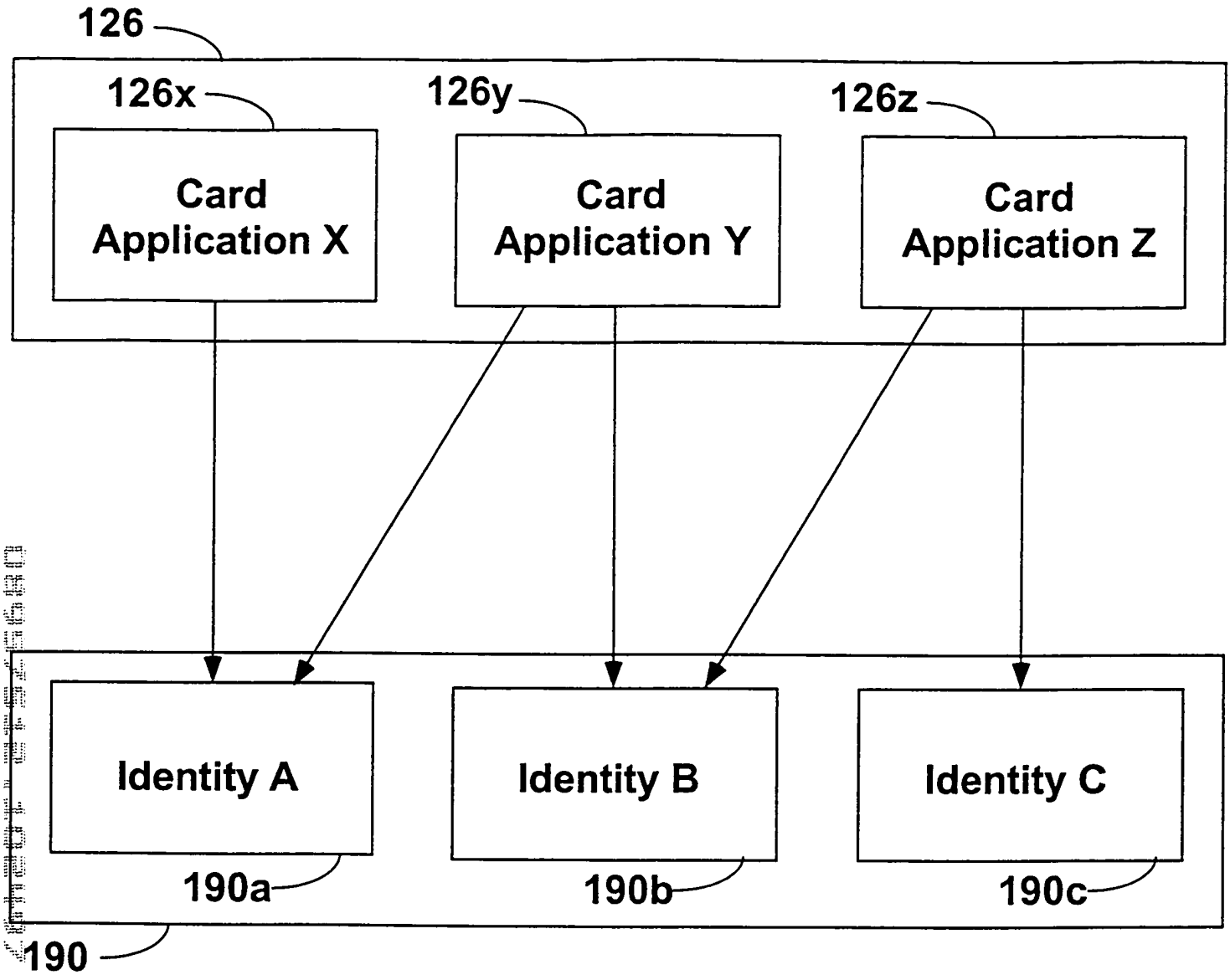

126
126x
126y
126z
Card Application X
Card Application Y
Card Application Z
Identity A
Identity B
Identity C
190a
190b
190c
190

Fig. 19

08/957512

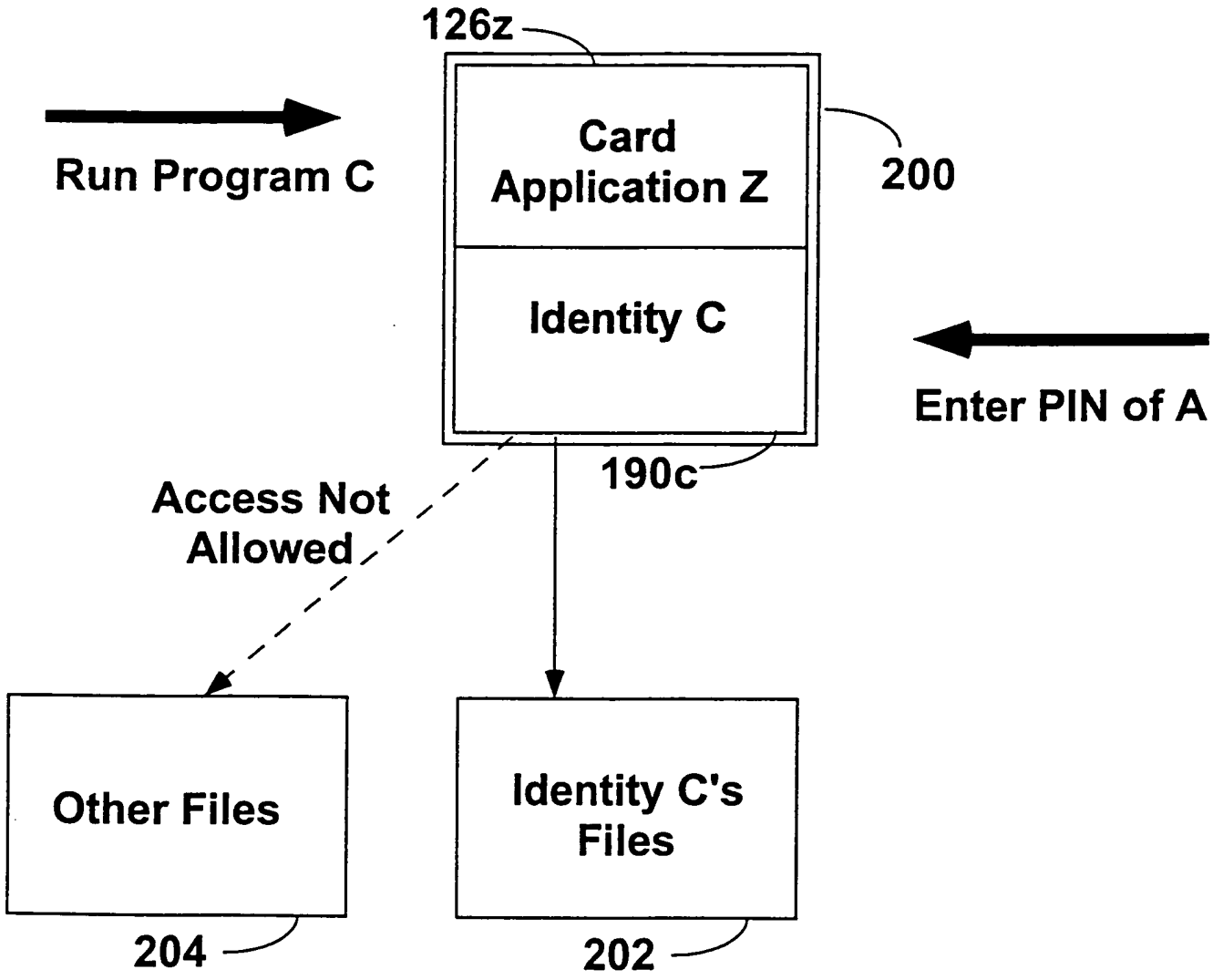


Fig. 20

Docket No. 9560-0

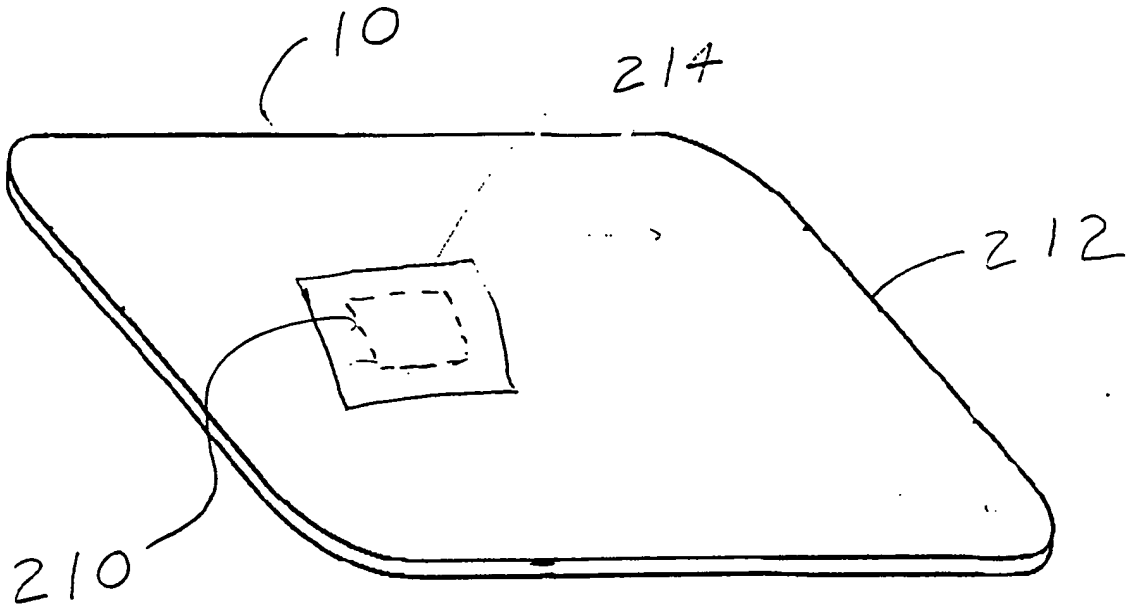


Fig. 21

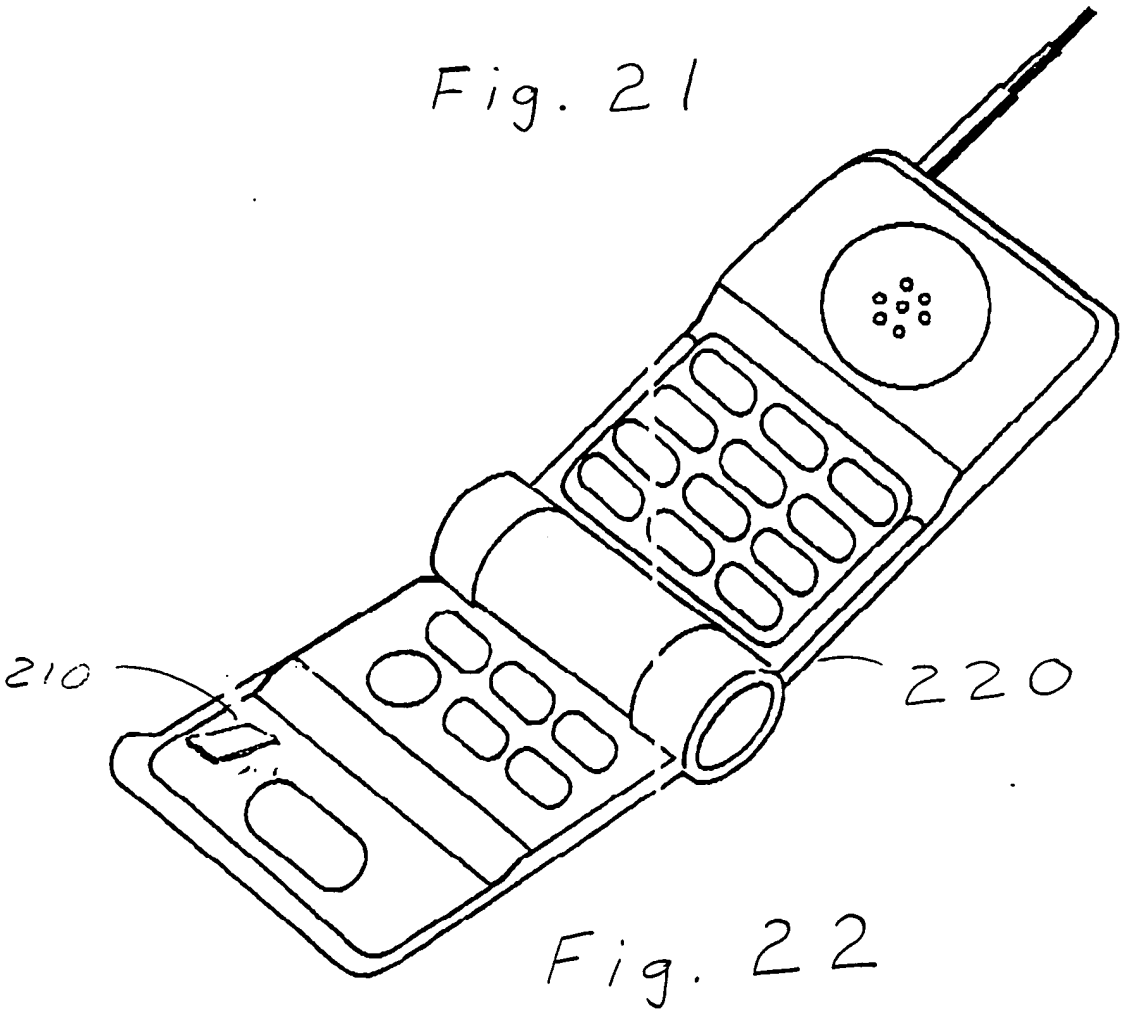


Fig. 22

08957512 - 071595

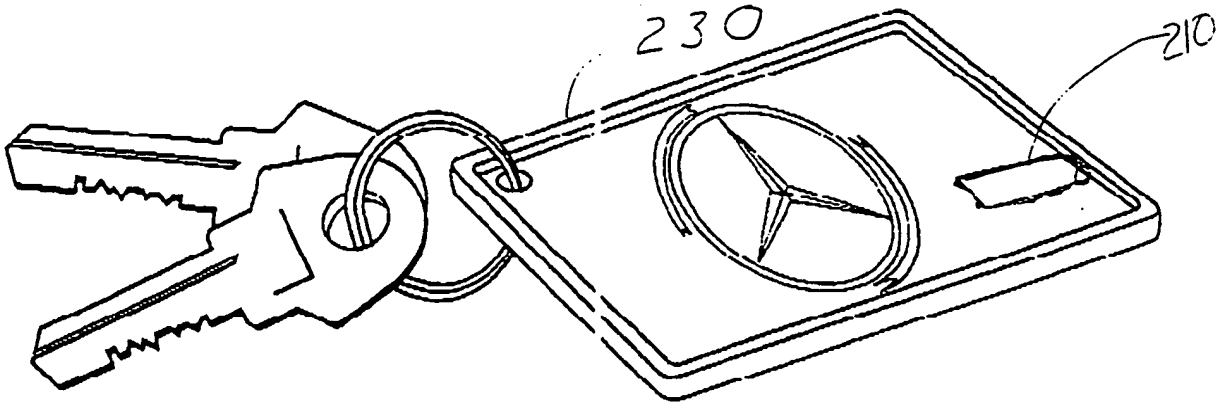


Fig. 23

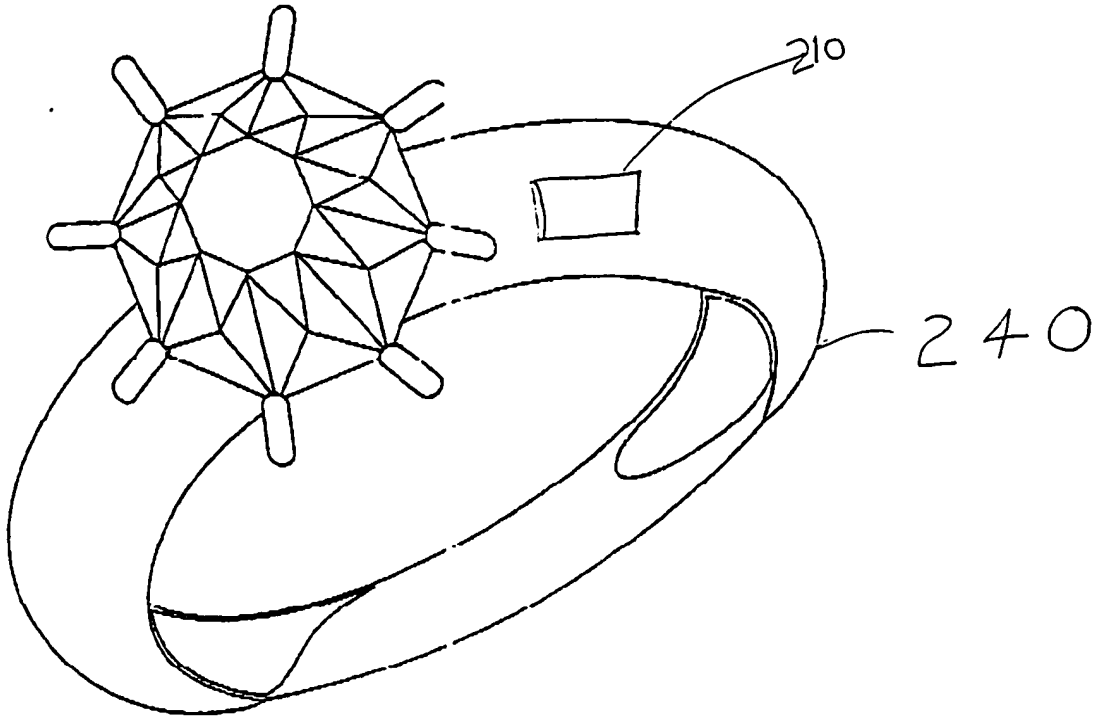


Fig. 24

Sheet 15 of 15 - 08/957,512

08/457512

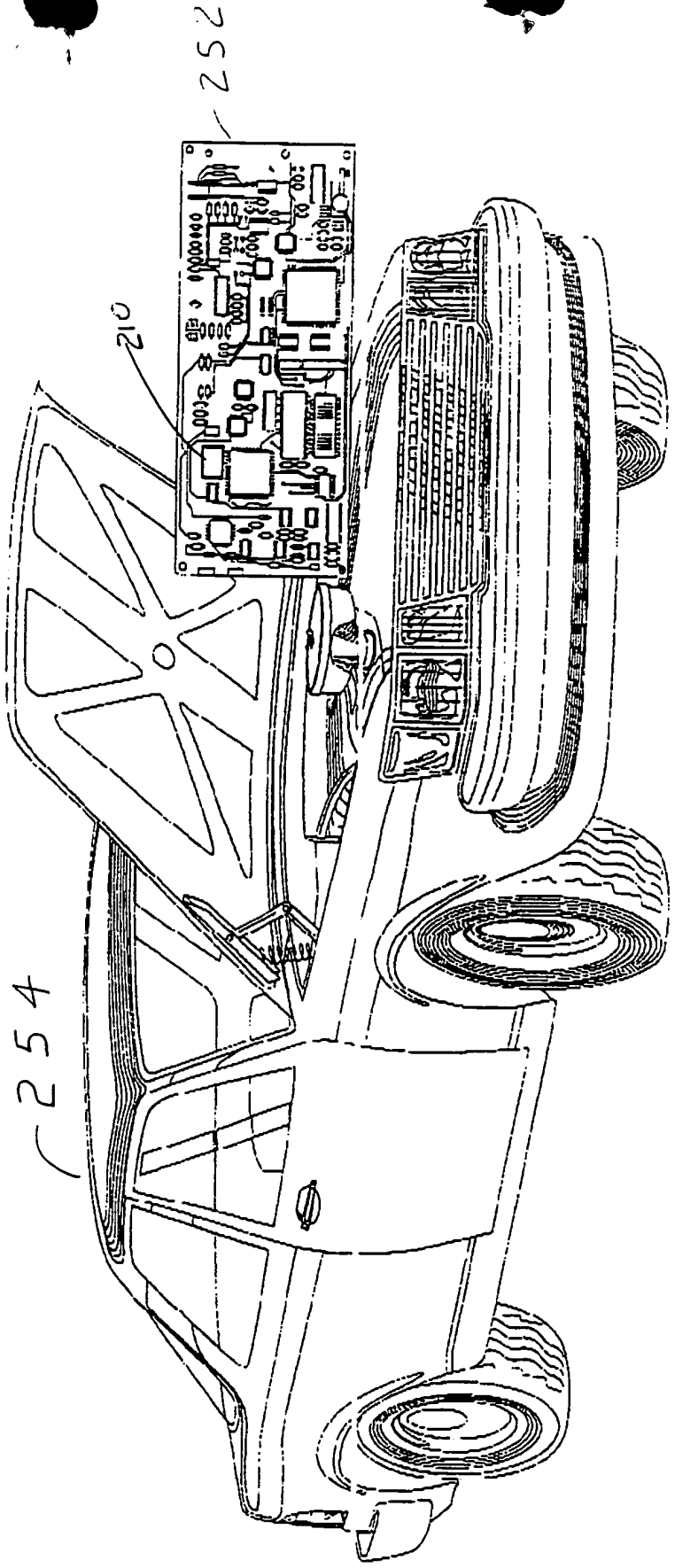


Fig. 25